

## **REMARKS**

Claims 1-5, 7, 9-18, and 20 are now pending in the application. Independent claims 1 and 11 are amended to include the respective features of dependent claims 8 and 19, effectively rewriting claims 8 and 19 into independent form. Accordingly, claims 8 and 19 are cancelled and the dependencies of claims 9 and 20 are amended. Claim 6 was cancelled in a prior amendment.

No new issues or new matter result from the present amendment and Applicants submit the amended claims are allowable. Entry is requested as the amendment and remarks herein are in response to a new rejection presented in the Final Office Action of September 3, 2008. Thus, the present amendment could not have been submitted earlier and Applicants submit the new rejection is a good and sufficient reason why the amendment is necessary and was not presented earlier, as per 37 CFR 1.116(b)(3). In addition, Applicants submit that the amended claims should be entered as they place the application in better form for appeal, as per 37 CFR 1.116(b)(2).

The Examiner is respectfully requested to enter the claims and reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

### **1. REJECTION UNDER 35 U.S.C. § 103 – REISER & NODA**

Claims 1, 2, 4, 7 & 16 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Reiser (U.S. Pub. No. 2004/0001982) in view of Noda (U.S. Pat. No. 5,623,390).

Independent claims 1 and 11 are amended to include features of former dependent claims 8 and 19, respectively. As former claims 8 and 19 are not rejected

over Reiser and Noda, the present rejection is now moot. Applicants therefore request reconsideration of the claims and withdrawal of the rejection.

## **2. REJECTION UNDER 35 U.S.C. § 103 – GENC, MATSUOKA, & NODA**

Claims 1-5, 7-9, 11-16 & 18-20 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Genc (U.S. Pub. No. 2002/0160245) in view of Matsuoka (U.S. Pub. No. 2004/0062964) and Noda (U.S. Pat. No. 5,623,390). This rejection is respectfully traversed.

Independent claims 1 and 11 are drawn to a fuel cell and a method of manufacturing an MEA fuel cell that are not obvious over the combination of Genc, Matsuoka, and Noda. The present claims include features absent from the reference combination, namely the claimed two enclosures, two vents, and their particular relationships to the overall structure are not taught by the combination and hence there is no *prima facie* case of obviousness. What is more, there is no apparent reason based on the references themselves or the general knowledge in the art by which a skilled artisan would be led to modify the references to include the missing subject matter.

Claim 1 is drawn to a fuel cell that includes a coolant flow path configured to pass coolant through the fuel cell to cool the fuel cell. An enclosure encompasses at least a part of the coolant flow path. The at least a part of the coolant flow path includes a coolant reservoir, and hence the coolant reservoir is encompassed by the enclosure. A passive hydrogen vent is configured to vent hydrogen from the enclosure. A second

enclosure encompasses at least a part of the hydrogen flow path, the coolant flow path, or both. The second enclosure has a hydrogen vent configured to vent hydrogen.

As illustrated in paragraph [0006] of the original specification, hydrogen can accumulate in the coolant system of the fuel cell. For example, hydrogen has been found to migrate into the coolant flow field and accumulate in the cooling system. Hydrogen may also disassociate from the coolant itself. Prior venting of accumulated hydrogen from a fuel cell included use of a hydrogen detector and/or fan to actively ventilate the reservoir. These electrical devices consume electricity, reducing the efficiency of the fuel cell and can ventilate coolant vapor resulting in loss of coolant. The present claims address these problems.

In contrast, the Genc, Matsuoka, and Noda combination does not include the enclosure, passive hydrogen vent, second enclosure and hydrogen vent, and corresponding structure relationships of the present claims. Genc is provided for disclosing the placement of a release valve 30 in a coolant flow path of a cooling system 20. Genc Fig. 1; paragraph [0019]. Genc does not teach configuring the release valve to vent hydrogen from an enclosure that encompasses at least a part of the coolant flow path including the coolant reservoir. In fact, the Genc cooling system only includes a cooling loop/conduit 22, heat exchanger 24, and pump 26 and does not even contemplate a coolant reservoir. Nor does Genc teach a second enclosure with another hydrogen vent where the second enclosure encompasses part of the hydrogen flow path, the coolant flow path, or both.

Matsuoka is provided for teaching a fuel battery 1 housed by a chassis 3. Matsuoka Figs. 1-8; paragraph [0030]. An exhaust vent 23 discharges exhaust gas

from the anodes 7 of the fuel cell 5. Matsuoka paragraph [0037]. For example, the exhaust gas contains carbon dioxide, which is an oxidation product of methanol used in the fuel cell. Matsuoka paragraphs [0030], [0037]. Exhaust discharge in this case is from the mixing buffer tank 19; the exhaust vent 23 is not venting gas (e.g., carbon dioxide or hydrogen) enclosed within the chassis 3. In other words, gas within space enclosed by chassis 3 cannot exit via vent 23. If gas was to leak from fuel cell 5 into the chassis 3 enclosure, such as carbon dioxide flowing from anode 7 through exhaust path 41 and pump P4 to mixing buffer tank 19, the gas cannot exit the chassis 3, it can only exit via exhaust vent 23 if it is within the mixing buffer tank 19. Gas that leaks into the chassis 3 enclosure in Matsuoka is trapped there. Matsuoka Figs. 1-8. Therefore, exhaust vent 23 of Matsuoka is not configured to vent gas from the chassis 3 enclosure. Chassis 3 could fill with any gas, for example CO<sub>2</sub> or H<sub>2</sub>, there is no way for it to exit.

As a result, the straightforward combination of Genc and Matsuoka fails to provide either an enclosure encompassing a coolant reservoir and having a passive hydrogen vent or a second enclosure encompassing part of the hydrogen and/or coolant flow path having a hydrogen vent. In addition, there is no reason for a person of ordinary skill to modify the combination of Genc and Matsuoka to include either enclosure-vent relationship, much less to modify the combination to include both enclosure-vent relationships.

Even if a skilled artisan was to add a second enclosure to Matsuoka, and further include a vent as per Genc, the references fail to provide any reason to configure the enclosures and vents as found in claim 1. Notably, the skilled artisan would have to further modify the chassis of Matsuoka to include a vent configured to allow gas trapped

in the chassis to exit and would have to further modify an enclosure to encompass a coolant reservoir and include a vent to vent hydrogen.

In fact, Genc and Matsuoka do not contemplate venting hydrogen at all. Genc's use of a vent is for venting gases, mainly air, which are drawn into the cooling system from the outside or from a fuel cell cabinet due to negative pressure. Genc paragraph [0004]. Matsuoka's use of a vent is for venting exhaust gases, as oxidation products formed per the normal operation of the fuel cell. Matsuoka paragraphs [0030], [0037]. Neither contemplates issues relating to hydrogen buildup within enclosures of a fuel cell system.

Noda is provided for teaching that hydrogen gas should be vented from a computer having a nickel-hydrogen battery so that it does not reach the explosive concentration of 4%. Noda col. 9, lines 7-27. Even so, Noda does not relate this problem to fuel cells, nor does Noda solve a problem of accumulation of H<sub>2</sub> in a coolant system, nor does Noda provide any guidance regarding the configuration of vents and enclosures within fuel cells and cooling systems. Consequently, Noda cannot cure the deficiencies of Genc and Matsuoka and fails to provide any guidance or reason for a skilled artisan to modify the collective teachings to include the missing features. As a result, claim 1 and dependent claims stemming therefrom are patentable over the combination of Genc, Matsuoka, and Noda.

With respect to claim 11, a method of manufacturing an MEA fuel cell is provided. A hydrogen fuel flow path is created to conduct hydrogen through the MEA fuel cell. An enclosure is created around a fuel cell stack which captures hydrogen that leaks, directly or indirectly, from the hydrogen fuel flow path and a hydrogen vent is

provided in the enclosure. A second enclosure is created which captures hydrogen that leaks, directly or indirectly, from the hydrogen fuel flow path. A second hydrogen vent is provided in the second enclosure.

As described above, the straightforward combination of Genc and Matsuoka fails to provide the two claimed enclosure-vent relationships. In particular, Matsuoka fails to provide a vent in the chassis 3 so that hydrogen captured by the chassis 3 may exit. And neither Genc nor Matsuoka provide an enclosure with a vent that captures hydrogen that leaks from the hydrogen fuel flow path. Inclusion of the Noda teachings, relating to computer battery permeable membranes that reduce hydrogen gas, fails to cure these defects. Noda is devoid of any instruction regarding enclosure-vent relationships pertaining to fuel cell systems and structure. Consequently, claim 11 and claims stemming therefrom are patentable over Genc, Matsuoka, and Noda.

Applicants request reconsideration of the claims and withdrawal of the rejection.

### **3. REJECTION UNDER 35 U.S.C. § 103 – GENC, MATSUOKA, NODA, & BUZZELLI**

Claims 10 & 17 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Genc (U.S. Pub. No. 2002/0160245) in view of Matsuoka (U.S. Pub. No. 2004/0062964) and Noda (U.S. 5,623,390) as applied to claims 1 & 16 respectively and further in view of U.S. Buzzelli (U.S. Pat. No. 4,168,349).

Independent claims 1 and 11 are amended to include features of former dependent claims 8 and 19, respectively. As former claims 8 and 19 are not rejected over Genc, Matsuoka, Noda, and Buzzelli, the present rejection is now moot.

Applicants therefore request reconsideration of the claims and withdrawal of the rejection.

**4. REJECTION UNDER 35 U.S.C. § 103 – REISER, NODA, & BUZZELLI**

Claims 10 & 17 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Reiser (U.S. Pub. No. 2004/0001982) in view of Noda (U.S. Pat. No. 5,623,390) as applied to claims 1 & 16 respectively and further in view of Buzzelli (U.S. Pat. No. 4,168,349).

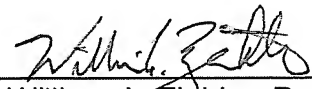
Independent claims 1 and 11 are amended to include features of former dependent claims 8 and 19, respectively. As former claims 8 and 19 are not rejected over Reiser and Noda, the present rejection is now moot. Applicants therefore request reconsideration of the claims and withdrawal of the rejection.

## 5. CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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